Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "Identification of hydrological model parameters for flood forecasting using data depth measures" *by* T. Krauße and J. Cullmann

T. Krauße and J. Cullmann

thomas.krausse@tu-dresden.de

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We greatly appreciate your thoughtful comments that helped improve the manuscript. We trust that all of your comments have been addressed accordingly in a revised manuscript. Thank you very much for your effort. In the following, we give a point-by-point reply to your comments:

>The authors often refer to their own (submitted) paper by (Krausse and Cullman 2011) but the readers cannot read >it – so the material which is important for the considered paper should be presented here. AROPE method should >be introduced, at least

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briefly.

We merged this paper with another manuscript also submitted to HESS. The merged version now introduces the AROPE method and other issues that are important for the understanding of this paper.

> Introduce relative peakflow deviation (rPD)

We added a separate table (Table 4) that provides the definition of all used performance criteria. Consider that we also redefined the FloodSkill criterion (a higher Flood-Skill value now indicates a better model performance considering flood events) and repeated the case studies.

>PSO and other randomized search methods were not designed as uncertainty analysis methods. This means that the >vectors generated do not necessarily follow cover the space well and/or follow the prior distributions - which is >done by standard MC proce- dures. The objective of PSO and similar methods (like GA, ant colony optimization, >adaptive cluster covering, SCE-UA, AMALGAM, etc.) is to quickly move towards the global optimum, so that the >parameter space will not be thoroughly explored. There have been studies reported when such methods were >indeed used for uncertainty anal- ysis as well, but there is of course no surprise they are more economical since >they are not geared towards exploration of parameter space. I would suggest providing some brief discussion on >this issue, or at least mentioning this. I would also suggest to provide references to the methods of "economical" >uncertainty analysis (sampling) that are combining ideas of on random search methods and MCMC Metropolis >algorithm (SCEM-UA, DREAM, etc) – see papers by Vrugt and co-authors.

We introduced a brief discussion on this issue into the introduction section. Furthermore we provide some results that support the ability of the developed PSO based approach PSO-GA_u for the estimation of good parameter vectors within a larger region. They are presented in the course of the presentation of this method. Please refer to Figure 6a) and b) on page 10. We attached these figures to this comment as well.

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>I am not sure the test functions used really represent the reality of response surfaces (error functions) characteristic >of hydrologic models which often have large flat areas and a number of local minima. Rosenbrok is of course a >smooth single extremum function. Rastigin function, on the other hand, is a function with many dozens of local >minima with close values which are on a rectangular grid, but with extremely high variability. The authors are >invited to provide some evidence that the considered functions resemble the real ones characteristic of the >considered calibration problems.

According to the comments of other reviewers and the editor's comment we removed this section from the manuscript.

>There is a notion of validation (or testing) the calibrated model. The authors use a very close term "transferability". >It is suggested to explain the relation between the two.

We agree with you. That is why we inserted a brief discussion on this issue in the introduction ("this approach robust parameter estimation method. Within this scope the concept of robustness is related to the term of transferability ...") on page 2, column 2.

>Editorial comments: >PP 2375-2376 – there is certain repetition. It is advisable to restructure the text to avoid it. > P 2378, L11: change 'by means' to 'in terms'. P 2396 L 11: change 'from' to 'to'
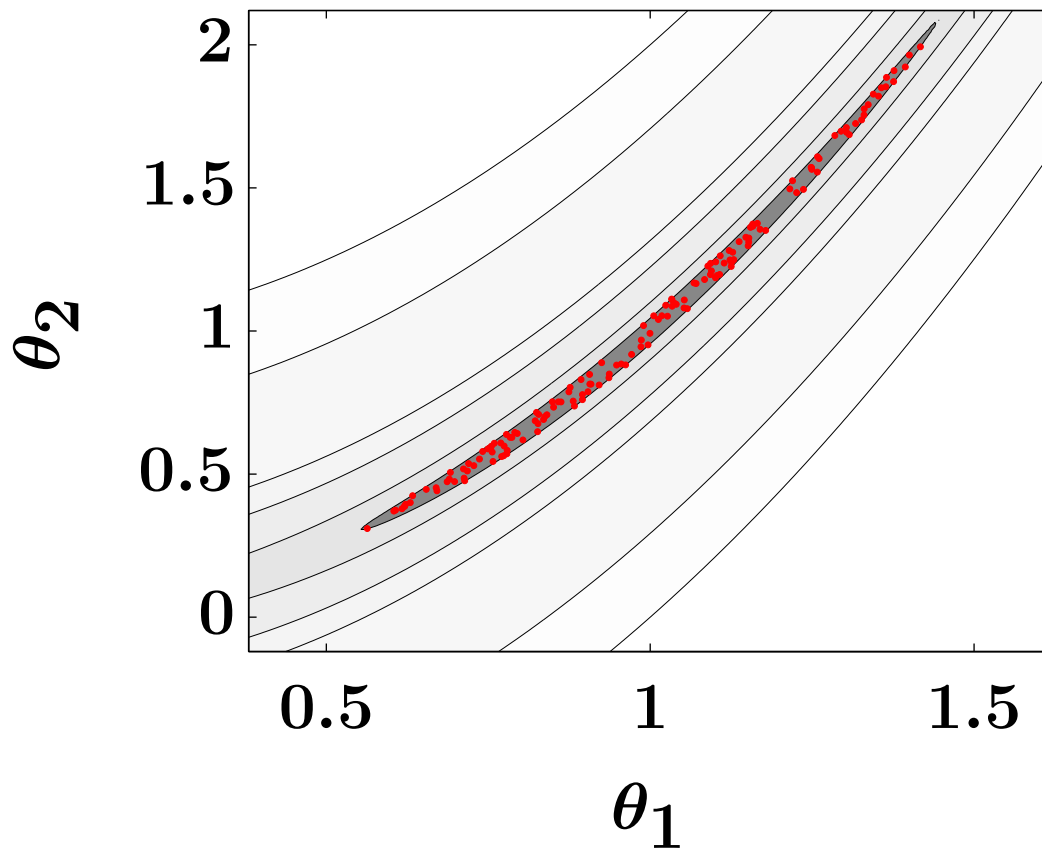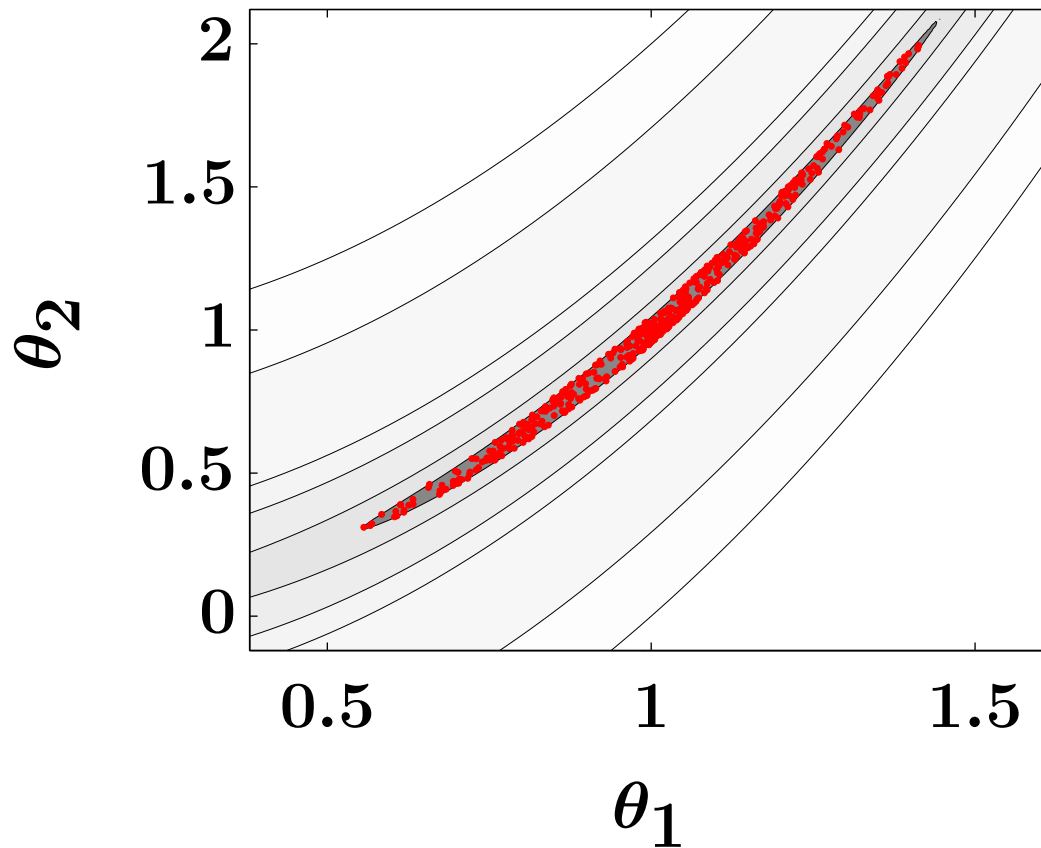
We considered your editorial comments for the reformatting of the manuscript.

Kind regards,

Johannes Cullmann and Thomas Krauße

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 2423, 2011.

Fig. 1. Supplementary figure to this comment.

Fig. 2. Supplementary figure to this comment.